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Environment Fact Sheets

Irrigation methods and conservation practices on Canadian farms, 2014

by Environment, Energy and Transportation Statistics Division

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. not available for any reference period
.. not available for a specific reference period
... not applicable
0 true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

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Irrigation methods

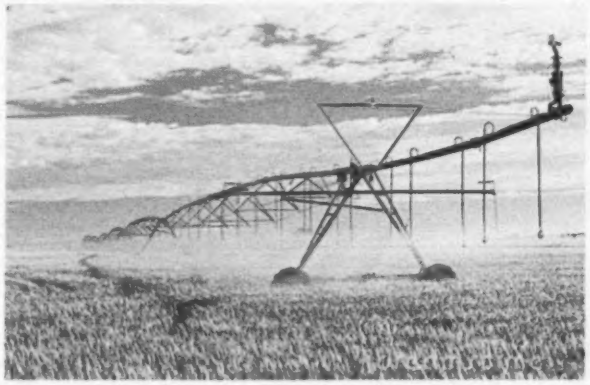
The three main types of irrigation used by Canadian agricultural operations include sprinkler irrigation, micro-irrigation, and surface irrigation. The irrigation method used depends on several factors, including the type of crop, the type and quality of water supply, and soil and climatic conditions, which can vary considerably from one part of the country to the other.

In 2014, as in 2012, farm operations most often used sprinkler irrigation methods to irrigate their crops (76% of farms that irrigated in 2014), with the majority of these farms being in the West. Farms in British Columbia and in Alberta accounted for 80% of all the farms reporting this type of irrigation.

Water sources and availability

Farms can obtain water for irrigation from a number of sources, including on-farm surface or groundwater and off-farm water. Of the farms that irrigated in 2014, 19% obtained their irrigation water from on-farm groundwater; 38% from on-farm surface water; and 49% from off-farm sources (can be surface or groundwater).

Water availability was not a significant problem in 2014 as it was a fairly wet year, particularly in Saskatchewan, Manitoba, and Ontario. In 2014, 79% of farms reported that no issues prevented irrigation for any period of time, ranging from 62% of farms in Manitoba to 84% of farms in Quebec.



Some issues that can prevent irrigation include a shortage of surface or groundwater, poor water quality, and irrigation bans. Nationally, four percent of farms reported that they were unable to irrigate for a period of time due to a shortage of surface water, and one percent of farms due to a shortage of groundwater.

Crop types

Farms that grew field crops, such as canola and soybeans, were most likely to use sprinkler irrigation, with 93% of these irrigating farms reporting the use of this method. Sprinkler irrigation was also the most common method of irrigation used by farms that grew forage crops, such as hay and alfalfa; 90% of these farms used this irrigation method (Table 1).

The most common irrigation method reported for fruit operations was micro-irrigation, with 65% of the irrigating fruit growers using this type of system. Quebec, Ontario, and British Columbia showed the largest proportions of micro-irrigation use with 52%, 43% and 41% of irrigating farms reporting this method, respectively. Irrigation for fruit trees, common in these provinces, is also used as protection against frost and heat.

The majority of farmers irrigating vegetable crops reported using sprinkler irrigation over other methods (73%).

Conservation methods

Farmers using irrigation employ a range of water conservation practices, particularly when water availability or cost is a factor. Nationally, the most popular conservation methods used by irrigators were watering at night or in the morning (57%), using water or energy saving nozzles on their irrigation equipment (56%), incorporating compost or organic matter into the soil (56%), and pressure reduction (52%) (Chart 1).[1]

The most popular conservation practices differed by province. Farms located in the Atlantic region (78%), Quebec (84%), Ontario (86 %), and British Columbia (62%) were all most likely to conserve water by watering at night or in the morning (i.e. to avoid watering at mid-day when more water would be lost through evaporation). Irrigating farms in Manitoba and Alberta were most likely to use water or energy saving nozzles (81 % and 75%, respectively). Saskatchewan farm operators were most likely to conserve water by leaving stubble on the fields, a practice employed by 68% of all irrigating farms in the province.

Table 1
Percentage of irrigating farms by crop type and irrigation method, 2014[1,2]

	Field crops	Fruit crops	Vegetable crops	Forage crops
	percent			
Sprinkler irrigation	93	45	73	90
Micro-irrigation	5[E]	65	39	F
Surface irrigation	6	6	7[E]	16

[E] use with caution
F too unreliable to be published
1. Excludes Yukon, the Northwest Territories, and Nunavut.
2. A farm may use more than one irrigation method.
Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, Agricultural Water Survey, CANSIM Table 153-0140 (accessed March 16, 2016).

Irrigation Methods

Sprinkler irrigation systems distribute water above the crop canopy using a spray. Sprinkler irrigation systems include: hand move; solid or permanent set; side roll, wheel line, wheel move or wheel roll; traveller, volume gun, travelling gun, walker, overhead or circular; linear move; and centre pivot.

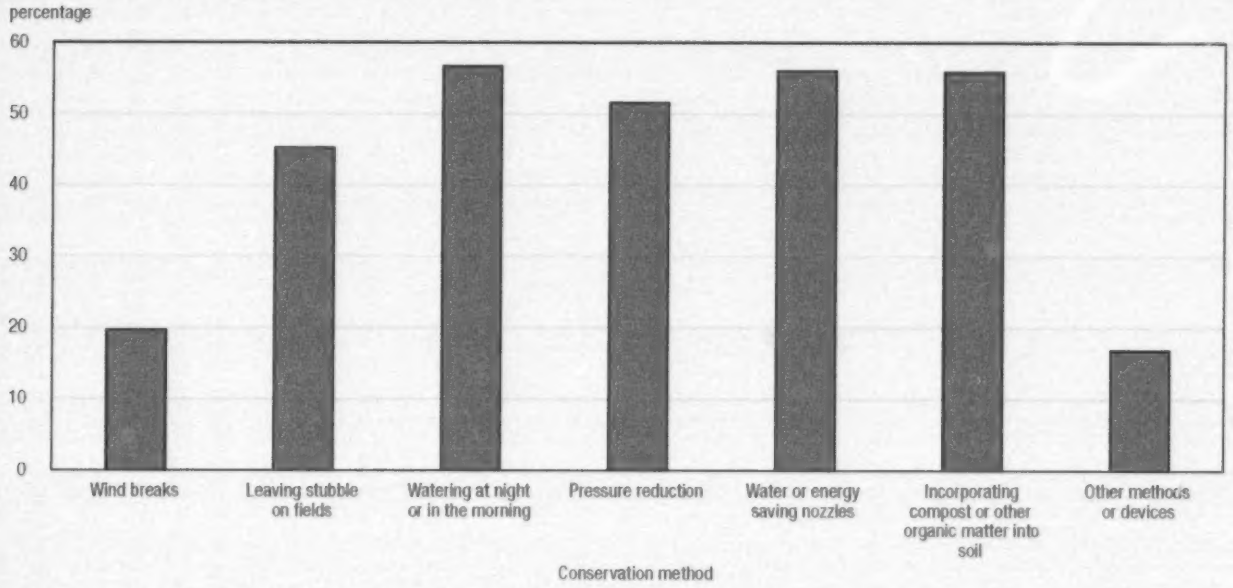
Micro-irrigation delivers water onto the soil surface very close to the crop or below the soil. Micro-irrigation systems include: surface drip; sub-surface drip; micro-sprinklers; bubblers; micro jets; and hand watering.

Surface irrigation water flows over the soil surface by gravity, either by flooding or in furrows. Surface irrigation systems include: down rows; furrows; corrugations; border dyke; level basins; uncontrolled flooding and back flooding; and exclude surface drip irrigation.

Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, Agricultural Water Survey.

1. A farm may use more than one practice.

Chart 1
Conservation methods used by Canadian irrigators, 2014



Note: Excludes Yukon, the Northwest Territories and Nunavut. A farm may use more than one method.
Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, Agricultural Water Survey, CANSIM tables 153-0137 and 153-0144 (accessed February 12, 2016).

Irrigation application efficiency

Irrigation application efficiency generally means how well water is getting to the roots of a crop. There are various factors that impact application efficiency such as slope, climatic conditions, and crop type. Poor management and/or design of equipment can also pose problems.

- Slope has an impact on the degree of infiltration or runoff but, if managed properly, runoff can be re-captured for re-use on fields.
- The amount of precipitation over a growing season or a soil moisture abundance or deficit will also affect how much water will infiltrate.

Irrigation application efficiency (continued)

Table 2
Potential application efficiencies for well-designed and well-managed irrigation systems

Irrigation system	Potential application efficiency
	percent
Sprinkler irrigation	
Low energy, precision	80 to 90
Linear move	75 to 85
Centre pivot	75 to 85
Surface irrigation	
Furrow (conventional)	45 to 65
Furrow (surge)	55 to 75
Furrow (with tailwater reuse)	60 to 80
Micro-irrigation	
Microspray	85 to 90
Subsurface drip	> 95
Surface drip	85 to 95

Source: Irmak, Suat, Lameck O. Odhiambo, William L. Kranz and Dean E. Eisenhauer. 2011. *Irrigation Efficiency and Uniformity, and Crop Water Use Efficiency*. Publication EC732. University of Nebraska-Lincoln Extension. http://www.extensionpublications.unl.edu/assets/pdf/ec732.pdf (accessed April 7, 2016).

Reference

Irrigation Water Management Study Committee, 2002, *South Saskatchewan River Basin: Irrigation in the21st Century. Volume 1: Summary Report*, Alberta Irrigation Projects Association, Lethbridge (Alberta).

About the Agricultural Water Survey

The Agricultural Water Survey is conducted every two years to gather information on irrigation water use, irrigation methods and practices, and sources and quality of water used for agricultural purposes on Canadian farms. The results will help farm operators, governments and the Canadian public gain a better understanding of the demand for water and how it is used on Canadian farms.

Other findings of the 2014 Agriculture Water Survey can be found here.

This survey is part of the Canadian Environmental Sustainability Indicators (CESI) program. The data collected is used in CESI's reporting activities. The information is used by Agriculture and Agri-Food Canada to inform water use policy and development of programs for Canadian irrigators. Statistics Canada also uses the survey results to continue to report on total water use by sector in Canada.

Available in CANSIM: tables 153-0134 to 153-0144.

Definitions, data sources and methods: survey number 5145.

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